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[Superseding IS 6816 (Parts 1 to 4) : 1973,
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IS 10778 (Parts 1 to 3) : 1983,
IS 12599 (Parts 1 to 4) : 1989, and
IS 12613 (Parts 1 to 4) : 1989]

भारतीय मानक

बुआई उपस्कर — बीज एवं खाद ड्रिल — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

SOWING EQUIPMENT — SEED-CUM-FERTILIZER DRILL — SPECIFICATION

(Second Revision)

ICS 65.060.30

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2000 **Price Group 9**

Farm Implements and Machinery Sectional Committee, FAD 59

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after, the draft finalized by the Farm Implements and Machinery Sectional Committee had been approved by the Food and Agriculture Division Council.

Seed-cum-fertilizer drill are being increasingly used for placing the seed and fertilizer at proper and uniform depth in lines. Besides it facilitates mechanizing agricultural operators.

This standard was first published in 1973 and was revised in 1993. It has been decided to revise the standard again for the following reasons :

a) To enlarge the scope to cover the requirements of IS 6816 (Parts 1 to 4) : 1973 'Specification for fluted feed roller type seed metering mechanism'; IS 6817 (Parts 1 to 2) : 1973 'Specification for plate type seed metering mechanism'; IS 10778 (Parts 1 to 3) : 1983 'Specification for furrow opener for seed-cum-fertilizer drills'; IS 12599 (Parts 1 to 4) : 1989 'Sowing and fertilizer application equipment — Fertilizer metering mechanism — Plate type'; IS 12613 (Parts 1 to 4) : 1989 'Sowing and fertilizer application equipment — Fertilizer metering mechanism, fluted feed roller type'. With the publication of this standard these standards will be withdrawn.

b) To incorporate requirement of one more type of seed and fertilizer metering mechanisms.

c) To update the standard.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SOWING EQUIPMENT — SEED-CUM-FERTILIZER DRILL — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard specifies the material, constructional requirements, performance and other requirements of seed-cum-fertilizer drills both animal-drawn and tractor-operated.

2 REFERENCES

The Indian Standards given in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 9855 shall apply.

4 TYPES

For the purpose of this standard, the seed-cum-fertilizer drills shall be of the following types depending upon the source of power:

a) Animal-drawn
b) Tractor-operated:
    1) Trailed, and
    2) Mounted.

NOTE — Animal-drawn drills shall be of trailed type only.

5 SIZE

5.1 The size of the drill shall be expressed by the number of seed furrow openers and the maximum spacing in millimetres between two adjacent furrow openers. For example, the size of drill, having 9 furrow openers and 225 mm row spacing, shall be 9 × 225.

6 MATERIALS

6.1 The materials for the construction of different components of the drill shall be selected from those given in col 3 of Table 1. The material should as far as possible conform to standards and grades as given in col 4 and 5 of Table 1.

7 HARDNESS

7.1 The furrow openers of shovel and shoe type shall be hardened to have Brinell hardness between 350 and 450 HB when tested in accordance with IS 1500. The hardness of disc of disc type furrow opener shall be as specified in **5** of IS 4366 (Part 1).

8 CONSTRUCTIONAL REQUIREMENTS

8.1 Frame and Toolbar

These should be rigid and strong. The toolbar should have 12.4 mm diameter holes after every 50 mm throughout its length if it has to be attached through nuts and bolts.

8.2 Wheels

Wheels should have either bushes or dust proof bearings. They should be strong and shall be provided with lugs or pegs. Wheels should be so attached that they can be easily lowered or raised.

8.3 Axles and Shafts

Axles and shafts should be so attached that they can be removed for cleaning when desired.

8.4 Seed and Fertilizer Boxes

These should be either separate or one continuous box with a partition. The boxes should have adequate capacity and shall be of trapezoidal shape. The boxes should be adequately covered to avoid entrance of water. The boxes should be sufficiently strong and should not buckle when fully filled with seed and fertilizer. The boxes should be provided with self locking mechanism on being opened.

8.4.1 The thickness of mild steel and galvanized steel sheet for boxes shall be not less than 1.0 mm and 0.63 mm respectively.

8.5 Tines

Tines should be properly attached with toolbar either by bolts and nuts or with clamps.

8.6 Furrow Openers

Furrow openers should be provided with depth adjustment arrangements. There may be different furrow openers for seed and fertilizer or common for

Table 1 Materials for Construction of Different Components

(*Clause* 6.1)

Sl No. (1)	Component (2)	Material (3)	Applicable Standard (4)	Grade (5)
i)	Frame and toolbar	Mild steel	IS 2062	—
ii)	Wheel	Mild steel	IS 2062	—
		Cast iron	IS 210	FG 200
		Pneumatic tyre	—	—
iii)	Axle and shaft	Mild steel	IS 2062	—
iv)	Seed and fertilizer boxes	Mild steel	IS 2062	—
		Galvanized iron sheet, Seasoned wood, Plastic, Fiber glass, reinforced plastics	IS 277	
v)	Tines	Mild steel	IS 2062	
		Carbon steel	IS 1570 (Part 3)	C55Mn75
vi)	Boot	Mild steel	IS 2062	—
		Cast iron	IS 210	FG 200
vii)	Furrow opener	High carbon steel	IS 1570 (Part 3)	C75
viii)	Seed agitator	Mild steel	IS 2062	
		Cast iron	IS 210	
		Aluminium	IS 617	
		PVC	—	—
		Rubber	—	—
		Canvas	—	—
ix)	Fertilizer agitator	Mild steel	IS 2062	
		Cast iron	IS 210	FG 200
		Aluminium	IS 617	A-4M
		Canvas	—	—
x)	Seed and fertilizer tubes	Steel ribbon	—	—
		Plastics	—	—
		Rubber	—	—
xi)	Seed metering mechanism (fluted roller type)			
	a) Seed feed roller, Seed feed cut-off, and Seed plate	Cast iron	IS 210	FG 200
		Mild steel	IS 2062	
		Nylon	—	—
	b) Seed feed cup	Aluminium	IS 617	A-4M
	c) Retaining ring and cover	Brass	IS 292	3
		Gun metal	IS 306	—
		Bakelite	—	—
xii)	Seed metering mechanism (Plate type)			
	Seed feed roller	Rubber	—	—
		Mild steel	IS 2062	
		Cast iron	IS 210	FG 200
xiii)	Fertilizer metering mechanism			
	a) Fertilizer feed roller, fertilizer feed cut-off	Cast iron	IS 210	FG 200
		Mild steel	IS 2062	
		Cast aluminium	IS 617	
		Nylon	—	—
	b) Retaining ring and cover	Brass	IS 292	3
		HDPVC	—	—
		Nylon	—	—
	c) Feed cup, agitator roller, auger roller	Cast Iron	IS 210	—
		HDPVC	—	—
		Nylon	—	—
	d) Fertilizer plate	Mild steel	IS 2062	—
		HDPVC	—	—
		Fiber glass—reinforced plastic	—	—
		Nylon	—	—
xiv)	Bushes	Brass	IS 292	3
		Gun metal	IS 306	—
		Nylon	—	—
xv)	Covering	Mild steel	IS 2062	—
		Cast iron	IS 210	—
		Seasoned wood	IS 399	—
xvi)	Pulley, sprocket	Cast iron	IS 210	FG 200
		Mild steel	IS 2062	—
xvii)	Hitching mechanism	Mild steel	IS 2062	—
xviii)	Feed adjusting mechanism	Mild steel	IS 2062	—
		Cast iron	IS 210	FG 200
xix)	Depth adjusting mechanism	Mild steel	IS 210	—
xx)	Row marker	Mild steel	IS 2062	—
		Cast iron	IS 210	FG 200

seed and fertilizer with the provision of dropping them separately.

8.6.1 Furrow openers of shovel, shoe or disc type shall conform to the requirements as given in Annex B.

8.7 Seed and Fertilizer Tubes

The tubes shall be of suitable length and shall be properly clamped with feed outlets of metering mechanism. There should not be any sharp bend in tubes. Tubes should be made of transparent plastics.

8.7.1 The thickness of plastic tubes shall be 2.5 mm, *Min.*

8.8 Metering Mechanisms

8.8.1 The seed metering mechanism components of fluted feed roller and plate type shall be in conformity to the requirements given in Annex C. Other types of seed metering mechanisms may also be used.

8.8.2 The fertilizer metering mechanism components, of fluted feed roller and plate type shall conform to the requirements as given in Annex D.

8.8.3 The tolerances on the dimensions wherever not specified shall be very coarse class as specified in IS 2102 (Part 1).

8.9 Transmission System

Transmission system of seed drill shall be sprocket and chain, or gear type. Provisions for tightening of belt and adjustment of chain shall be provided. Suitable clutches may be provided to stop the movement of metering mechanisms when the wheels are turned in reverse direction. The transmission system shall be provided with a guard for safety.

9 PERFORMANCE REQUIREMENTS

9.1 The variation in dropping of seed and fertilizer in different feeding outlets separately shall be not more than 7 and 12.5 percent respectively from the average quantity obtained.

9.2 The variation in quantity dropped per hectare and quantity specified to be dropped at a particular setting shall be not more than 7 and 12.5 percent for seed and fertilizer respectively.

9.3 The seed and fertilizer rate shall be easily adjustable up to 125 kg and 1 000 kg per hectare respectively.

9.4 The percentage of visible damage to seed in the drill shall not exceed 0.5 percent.

9.5 The variation in dropping due to box filling at 1/4, 1/2 and 3/4 of rated capacity shall not exceed 10 percent.

9.6 The variation in quantity of seed dropping due to change in speed shall not exceed 15 percent of the quantity dropped under the specified speed.

9.7 The variation in quantity of seed per metre of row length shall not exceed by 10 percent.

9.8 The drill shall be able to sow seed up to 100 mm deep and should be able to drop fertilizer at a minimum of 25 mm to the side of the seed.

9.9 The draft of animal-drawn drill shall be not more than 125 kgf.

9.10 The wheel slip at specified speed shall not exceed by 15 percent.

9.11 The drill shall be able to sow wheat and one or more of the following seeds:

a) Barley,
b) Paddy,
c) Millet,
d) Pea,
e) Bengal gram,
f) Soybean, and
g) Pigeonpea.

The drill shall also be able to sow all type of granular fertilizers.

9.12 The above requirements shall be tested in accordance with IS 6316 as detailed below:

Performance Requirements (Ref to Cl No. of This Standard)	*Method of Test (Ref to Cl No. of IS 6316)*	
	Type Testing	Routine Testing
9.1, 9.2 and 9.3	5.1.1 and 6.1	5.1.1
9.4	5.1.2	5.1.2
9.5, 9.6 and 9.11	5.1.1	—
9.7	5.2	5.2
9.8	6.2	—
9.9	6.3.1	—
9.10	6.3.1 and 6.3.2	—

10 OTHER REQUIREMENTS

10.1 The animal-drawn drill shall not have more than five furrow openers; and tractor-operated drill shall have 5 to 15 furrow openers.

10.2 The row spacing shall be adjustable, ranging from 150 to 225 mm, preferably in steps of 25 mm.

10.3 When the furrow openers are lowered to plain surface, the openers shall not deviate by more than 5 mm from the line of alignment vertically and horizontally.

10.4 The weight of tractor-mounted drill including the weight of seed and fertilizer filled at rated capacity of box shall not exceed 300 N/kW drawbar power of the tractor recommended for the drill.

10.5 A permanent type metallic calibration plate indicating the metering position and quantity of seed and fertilizer shall be attached under the top cover of seed box.

10.6 In case of all the trailed drills and mounted drills having plate type metering mechanism, arrangement for quick cut-off of the seed and fertilizer when the seed drill is moving, should be provided. This arrangement should be without disturbing the setting of metering mechanism.

10.7 Proper lubrication arrangements should be provided for all moving components except the portions exposed to seed and fertilizer.

10.8 In animal-drawn drill the system of hitching should be adjustable to suit the varying height of animals. For tractor-operated drills the system of hitching should be designed to suit the three point linkage and drawbar of agricultural tractors (*see* IS 4468 and IS 4931).

10.9 Each drill shall be provided with instruction sheets containing full information on method of operation and installation of the drill.

10.9.1 Each drill shall also be supplied with necessary tools.

10.9.2 Provision should be made for easy removal of seed and fertilizer from the hopper after the days work.

10.9.3 Each drill shall be provided with a manual containing maintenance and storage instructions, calibration chart, etc.

11 ACCESSORIES

The following accessories may be provided with each drill:

a) Foot board,
b) Covering device,
c) Row marker,
d) Press wheel, and
e) Area recorder.

12 WORKMANSHIP AND FINISH

12.1 The welding shall be satisfactory in all respects and should not be brittle or porous.

12.2 The components shall be free from rust and shall have protective coating to prevent surface deterioration in transit and storage.

12.3 The components should be free from pits, burrs and other defects that may be detrimental for their use.

13 SAMPLING AND TESTS

13.1 One drill of each model shall be tested for all the requirements mentioned in this standard.

13.2 Each drill of a model shall be tested for requirements mentioned in **9.1** to **9.4**, **9.7**, **10.1** to **10.8** and **12.1** to **12.3**.

13.3 The testing of the seed-cum-fertilizer drill shall be done in accordance with IS 6316.

14 MARKING AND PACKING

14.1 Marking

Each drill shall be marked with the following particulars:

a) Indication of the source of manufacture;
b) Model, code and serial number;
c) Type and size;
d) Type of seeds (suitability) . . . . . . ; and
e) Mass.

14.1.1 *BIS Certification Marking*

The product may also be marked with the BIS Standard Mark.

14.1.1.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

14.2 Packing

Packing of the drill and its components should be done as agreed to between the purchaser and the supplier to avoid damage in transit.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
210 : 1993	Grey iron castings (*fourth revision*)
277 : 1992	Leaded brass ingots and castings (*second revision*)
292 : 1983	Galvanized steel sheet (plain and corrugated) (*first revision*)
306 : 1983	Tin bronze ingots and castings (*third revision*)
399 : 1963	Classification of commercial timbers and their zonal distribution (*revised*)
617 : 1994	Aluminium and aluminum alloy ingots and castings for general engineering purposes (*second revision*)
1500 : 1983	Method for Brinell hardness test for metallic materials (*second revision*)
1570 (Part 3) : 1979	Schedules for wrought steels: Part 3 Carbon manganese free cutting steels (*first revision*)
2062 : 1992	Steel for general structural purposes (*fourth revision*)
2102 (Part 1) : 1993	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*)
4366	Agricultural tillage discs:
(Part 1) : 1985	Concave type (*second revision*)
(Part 2) : 1985	Flat type (*second revision*)
4468	Agricultural wheeled tractors rear mounted three-point linkage:
(Part 1) : 1997	Category 1, 2, 3 and 4 (*fourth revision*)
(Part 2) : 1993	Category 1 N (narrow hitch) (*third revision*)
4931 : 1995	Agricultural tractor — Rear mounted power take-off —Type 1, 2 and 3 (*third revision*)
6316 : 1993	Sowing equipment—Seed-cum-fertilizer drill — Test code (*first revision*)

ANNEX B

(*Clause* 8.6.1)

FURROW OPENERS

B-1 DESCRIPTION

B-1.1 Shovel and Shoe Type

B-1.1.1 The furrow opener (*see* Fig. 1 and 2) shall consist of tine (shank), shovel or shoe depending upon type of furrow opener and boot with tubes for seed and fertilizer.

B-1.2 Disc Type

The disc type furrow opener (*see* Fig. 3) shall consist of mainly disc(s), tine holder and boot(s).

B-2 DIMENSIONS

B-2.0 The tolerance wherever not specified for various dimensions shall be of coarse type as given in IS 2102 (Part 1).

B-2.1 Shovel Type Furrow Opener

B-2.1.1 Shovel type furrow opener shall have dimensions as given in Fig. 1.

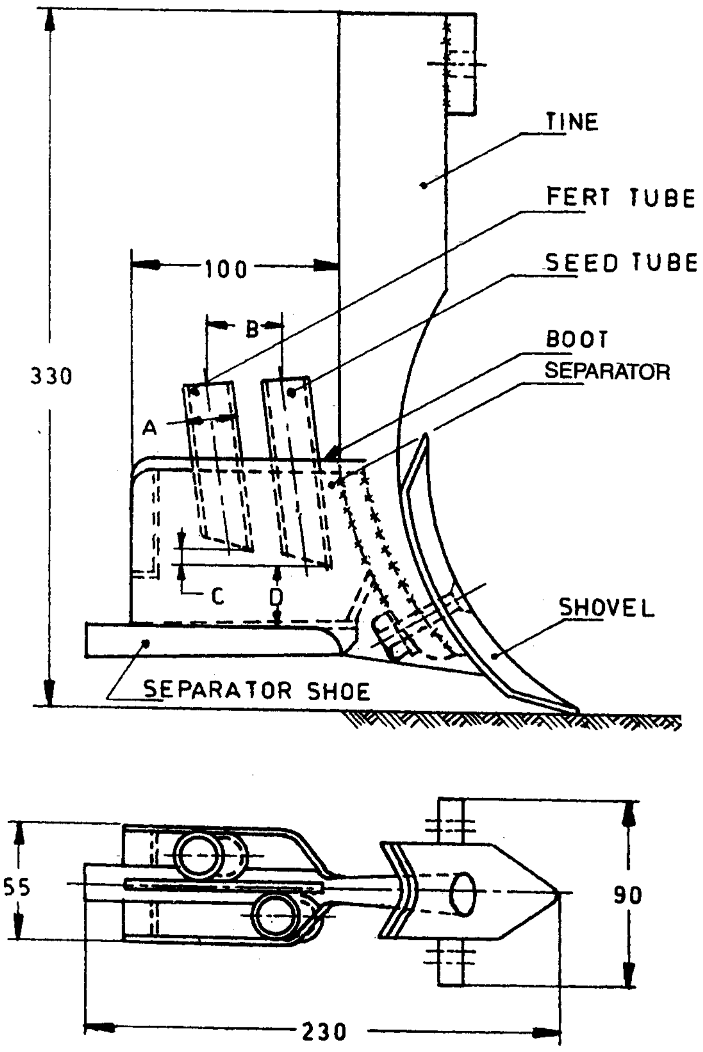
B-2.1.2 The essential dimensions of reversible shovel, when read in conjunction with Fig. 4 shall be as given in Table 2.

Table 2 Dimensions of Reversible Shovel

(*Clause* B-2.1.2)

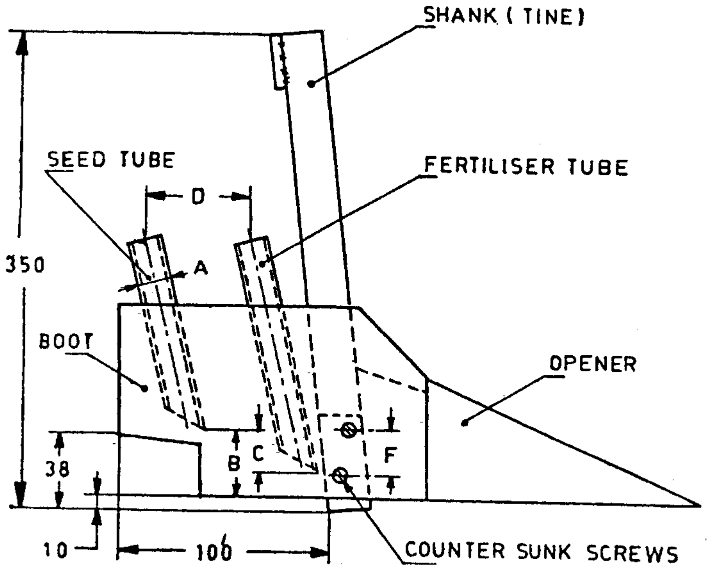
Sl No. (1)	*A* ±2 mm (2)	*B* ±2 mm (3)	*C* ±1 mm (4)	*D* ±0.5 mm (5)	*E* ±0.5 mm (6)	*α* ±5 deg (7)	*β* deg (8)
i)	150	35	25	11.5	45	45	10 to 20
ii)	150	45	25				
iii)	170	35	30				
iv)	170	45	30				
v)	180	35	30				
vi)	180	45	30				

B-2.1.3 The essential dimensions of single point and spear point shovels when read in conjunction with Fig. 5 shall be as given in Table 3.



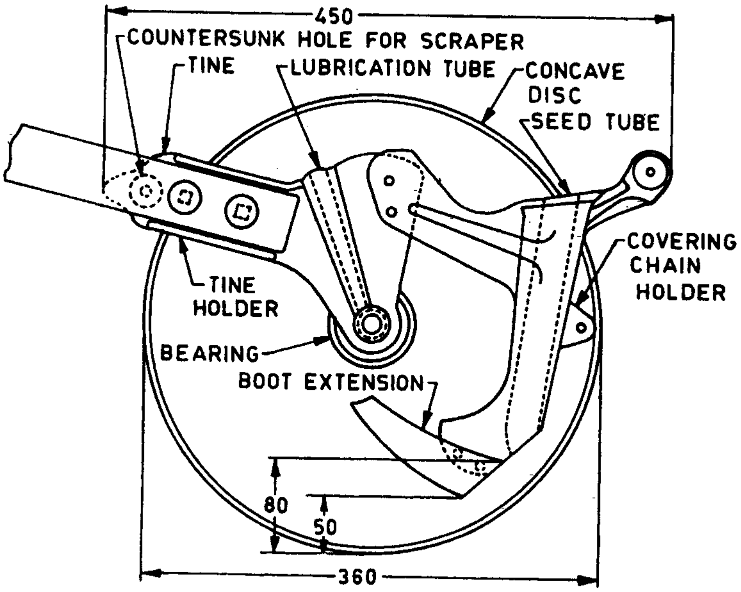
All dimensions in millimetres.

FIG. 1 REVERSIBLE SHOVEL TYPE FURROW OPENER



All dimensions in millimetres.

FIG. 2 SHOE TYPE FURROW OPENER



All dimensions in millimetres.

FIG. 3 SINGLE CURVED DISC OPENER

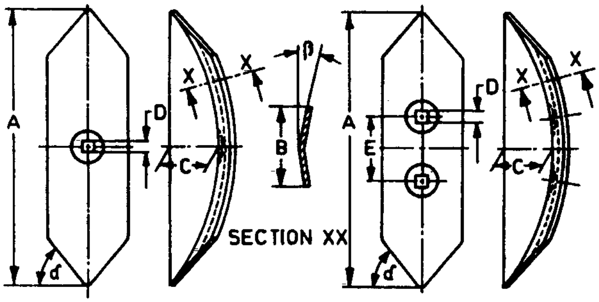


FIG. 4 REVERSIBLE SHOVEL

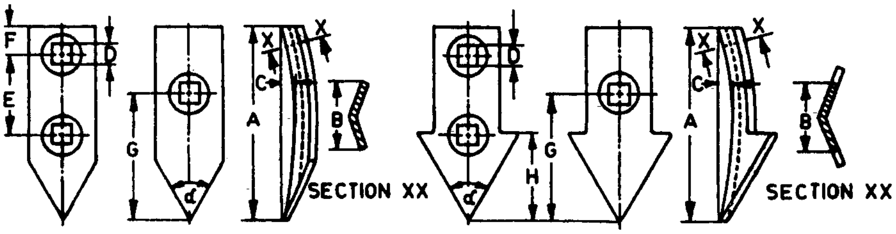


FIG. 5 SINGLE POINT AND SPEAR POINT SHOVELS

Table 3 Dimensions of Single Point and Spear Point Shovels

(*Clause* B-2.1.3)

Sl. No.	*A* ±2 mm	*B* ±1 mm	*C* ±1 mm	*D* ±0.5 mm	*E* ±0.5 mm	*F* ±1 mm	*G* ±1.5 mm	*H* ±1 mm	*α* ±5 deg
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	100	30	8	11.5	45	15	62.5	40	45
ii)	100	35	8	11.5	45	15	62.5	40	45
iii)	110	35	8	11.5	45	15	72.5	50	45
iv)	110	45	8	11.5	45	15	72.5	50	45
v)	120	35	10	11.5	45	15	82.5	60	45
vi)	120	45	10	11.5	45	15	82.5	60	45

B-2.2 Shoe Type Furrow Opener

B-2.2.1 Shoe type furrow opener shall have dimensions as given in Fig. 2.

B-2.2.2 The essential dimensions of shoe, when read in conjunction with Fig. 6 shall be as given in Table 4.

Table 4 Dimension of Shoe

(*Clause* B-2.2.2)

All dimensions in millimetres.

Sl No.	*A* ±1	*B* ±2	*C* ±1	*D* ±0.5	*E* ±0.5	*F* ±0.5	*G* ±0.5	*H* ±5	*J* ±5	*K* *Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	95	250	50	11	25	50	25	65	75	50
ii)	95	300	50	11	25	50	25	65	75	50
iii)	100	250	50	11	25	50	25	65	75	50
iv)	100	300	50	11	25	50	25	65	75	50

B-2.3 Disc Type Furrow Opener

B-2.3.1 Disc type furrow opener shall have dimensions as given in Fig. 3.

B-2.3.2 The minimum opening in boot shall be 25 mm and lower tip of the boot shall be minimum 50 mm vertically above the cutting edge of the disc.

B-2.3.3 The dimensions of flat type discs when read in conjunction with Fig. 7 shall be as given in Table 5.

Table 5 Dimensions of Flat Discs

(*Clause* B-2.3.3)

All dimensions in millimetres.

Sl No.	Dimensions			
	$d_{1\,-3.0}^{\;+2.0}$	$d_{2\,-0}^{\;+1.5}$	$d_{4\,-0}^{\;+1.5}$	*S*, *Min* (*see* Note)
(1)	(2)	(3)	(4)	(5)
i)	250	26 or 51	60 or 85	2.8
ii)	280	26 or 51	60 or 85	2.8
iii)	315	26 or 51	60 or 85	3.15
iv)	355	51	85	3.15

NOTE — *S*, thickness of plate shall not differ by more than 10 percent of the declared nominal value provided the thickness does not fall below the minimum value specified.

B-2.3.4 The dimensions of concave type discs when read in conjunction with Fig. 8 shall be as given in Table 6.

Table 6 Dimensions of Concave Discs

(*Clause* B-2.3.4)

All dimensions in millimetres.

Sl No.	Dimensions				
	$d_{1\,-3.0}^{\;+2.0}$	$d_{2\,-0}^{\;+1.5}$	d_4	*S*	Concavity *t* ± 2.5
(1)	(2)	(3)	(4)	(5)	(6)
i)	250	51	100	2.5	12.5
ii)	280	51	100	2.5	16.5
iii)	315	51, 65	100	2.8	20
iv)	355	51, 65	100	2.8	27.5
v)	405	51, 65, 72	100	3.15	35
vi)	455[1]	51, 65, 72	100	3.55	45

[1] Tolerance shall be $^{+3.0}_{-4.0}$

B-2.3.5 Each flat disc shall have 3 or 4 and concave disc shall have 4 or 5 fixing holes. These fixing holes shall be either round shape having dimensions (*see* d_3 in Fig. 7 and 8) $10.5^{-0}_{+0.5}$ mm or square shape having a side of $12.5^{-0}_{+1.0}$ mm.

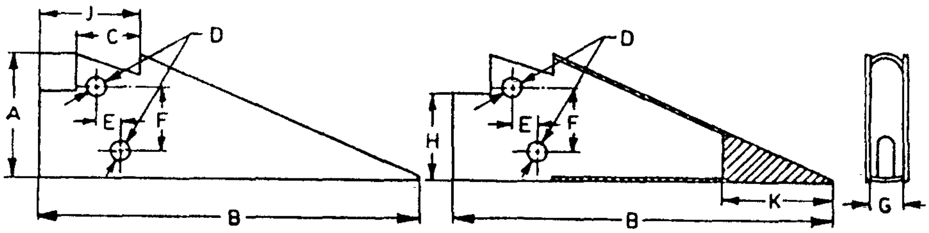


FIG. 6 SHOE TYPE FURROW OPENER

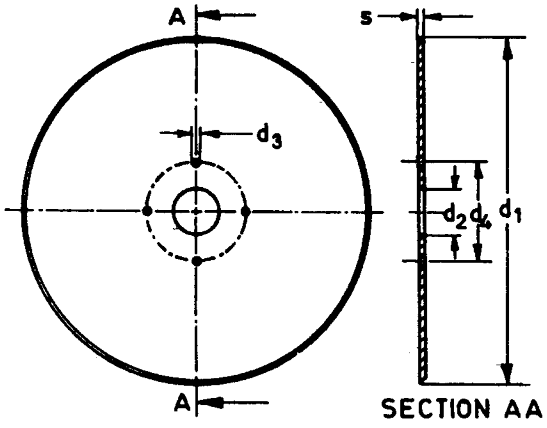


FIG. 7 FLAT DISC TYPE

B-3 OTHER REQUIREMENTS

B-3.1 Shovel and Shoe Type Furrow Openers

B-3.1.1 Provision shall be made in the tine for its fitment with frame of seed drill and for firing boot and shovel.

B-3.1.2 The boot shall be bolted or welded to tine so as to make it a rigid structure. The boot shall be shaped so as to separate the soil and create space for dropping of seeds and fertilizers effectively; provision of divider would be preferred.

B-3.1.3 One or two holes in the shovel shall be punched. The corners of the square holes shall be slightly rounded counter sunk bolt of 10 mm nominal size shall be used for fixing the shovel.

B-3.1.4 The cutting edge of the shovel shall be beveled to a distance of not more than 10 mm.

B-3.1.5 In shoe type furrow opener, the head of the fasteners shall flush with the working surface.

B-3.2 Disc Type Furrow Opener

B-3.2.1 In the furrow opener single concave discs or double flat discs shall be used.

B-3.2.2 Discs shall be provided with several fixing holes with or without central circular hole. The fixing holes shall be circular or square. Fixing holes shall be with 0.5 mm radius of nominal position.

B-3.2.3 Rivets of M10 size and counter sunk bolt of M12 shall be used.

B-3.2.4 Eccentricity and wobble in case of concave discs shall be as given in **9.1** of IS 4366 (Part 1). Flatness and eccentricity of flat discs shall be as given in **8.1** of IS 4366 (Part 2).

B-3.2.5 The cutting edge of the disc shall be levelled on one side upto a distance of 20 mm. The thickness of cutting edge shall be reasonably uniform and in between 0.2 to 1.0 mm.

B-3.2.6 Plain ball or roller bearing with proper lubrication shall be used.

B-3.2.7 Components such as tine, covering chain, boot, boot extension shall be detachable.

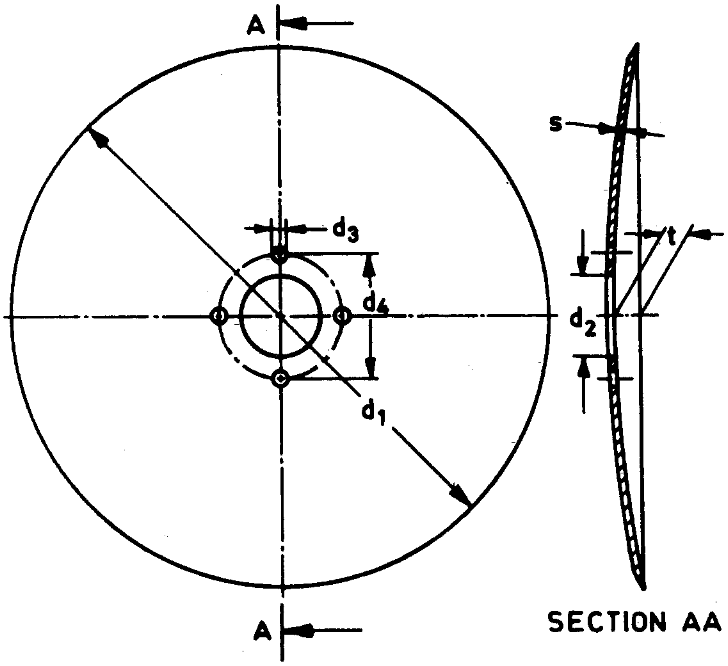


FIG. 8 CONCAVE DISC TYPE

ANNEX C

(*Clause* 8.8.1)

SPECIFIC REQUIREMENTS OF THE COMPONENTS OF SEED METERING MECHANISM

C-1 FLUTED FEED ROLLER TYPE

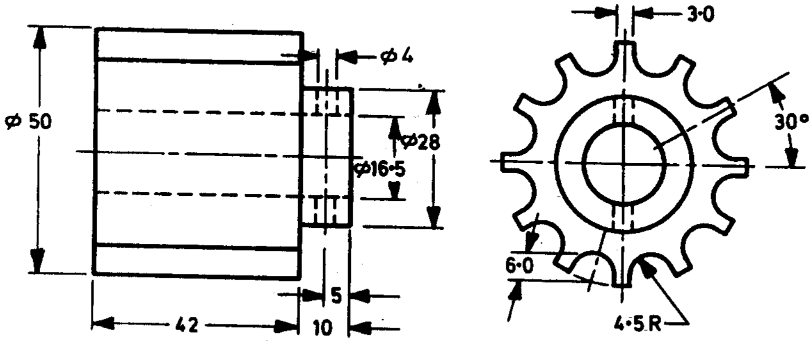
Fluted feed rollers shall be of three type namely, Type 1, Type 2 and Type 3.

C-1.1 Seed Feed Rollers

The dimensions of the seed feed rollers Type 1, Type 2 and Type 3 shall be as given in Fig. 9, Fig. 10 and Fig. 11. The hole for shaft in rollers may be either circular or square.

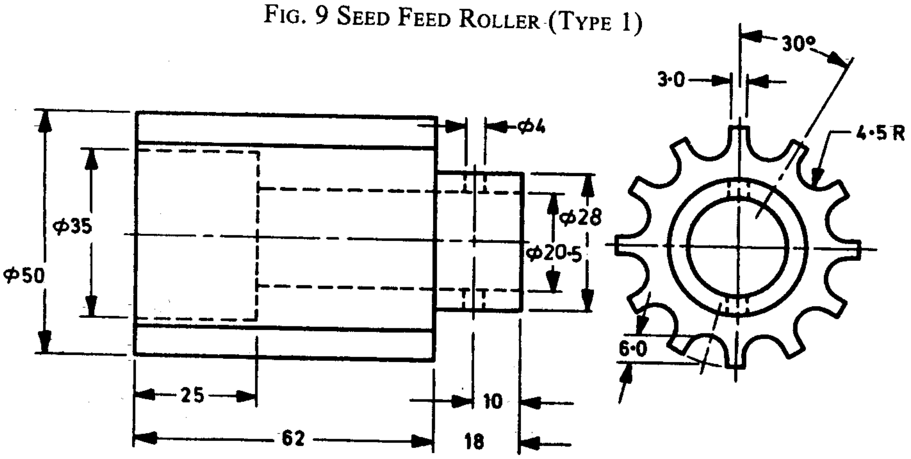
C-1.2 Seed Feed Cut-Off

The dimensions of seed feed cut-off Type 1, Type 2 and Type 3 shall be as given in Fig. 12, Fig. 13 and Fig. 14. The hole for shaft in cut-off may be either circular or square.



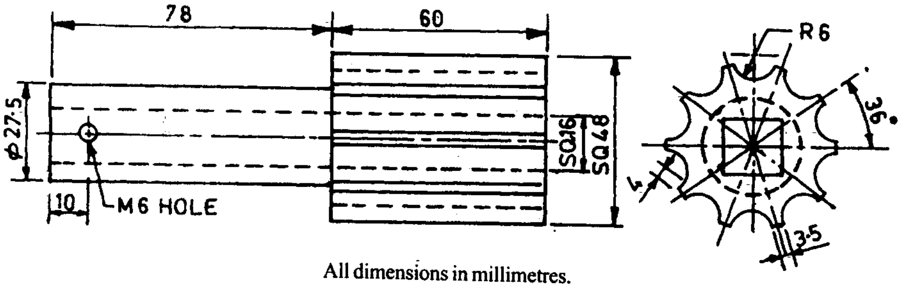
All dimensions in millimetres.

FIG. 9 SEED FEED ROLLER (TYPE 1)



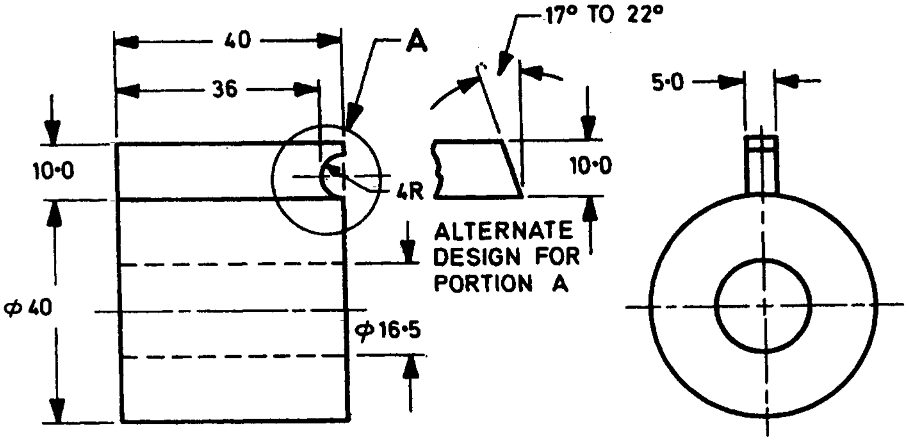
All dimensions in millimetres.

FIG. 10 SEED FEED ROLLER (TYPE 2)



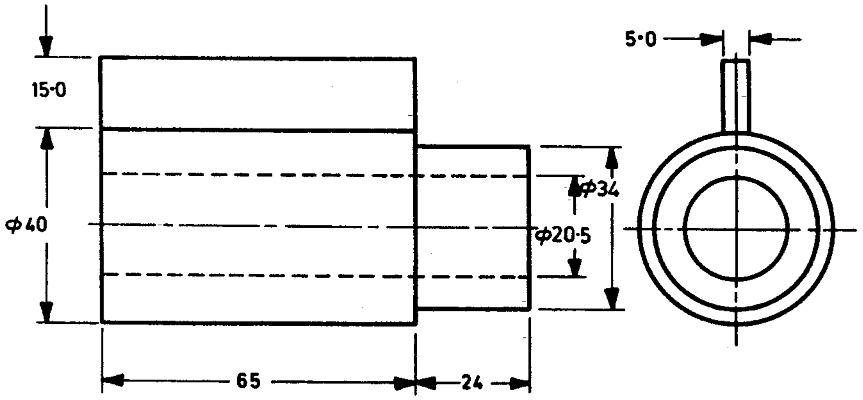
All dimensions in millimetres.

FIG. 11 SEED FEED ROLLER (TYPE 3)



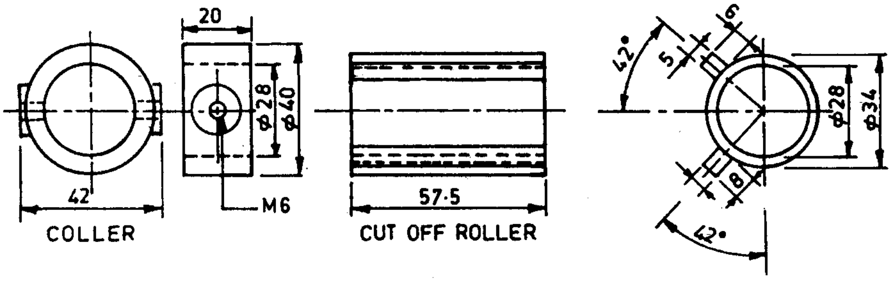
All dimensions in millimetres.

FIG. 12 SEED/FERTILIZER FEED CUT-OFF (TYPE 1)



All dimensions in millimetres.

FIG. 13 SEED/FERTILIZER FEED CUT-OFF (TYPE 2)



All dimensions in millimetres.

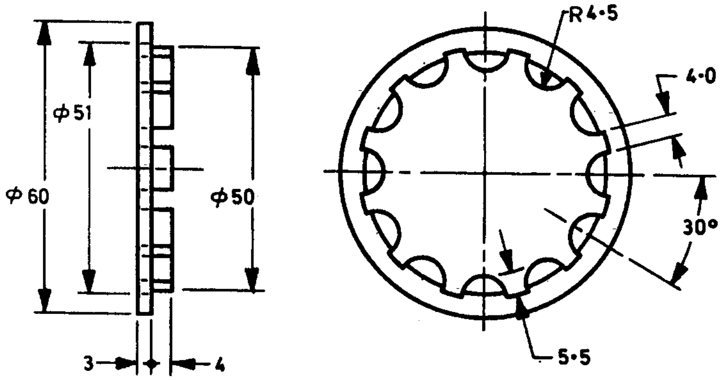
FIG. 14 SEED FEED CUT-OFF (TYPE 3)

C-1.3 Retaining Ring and Cover

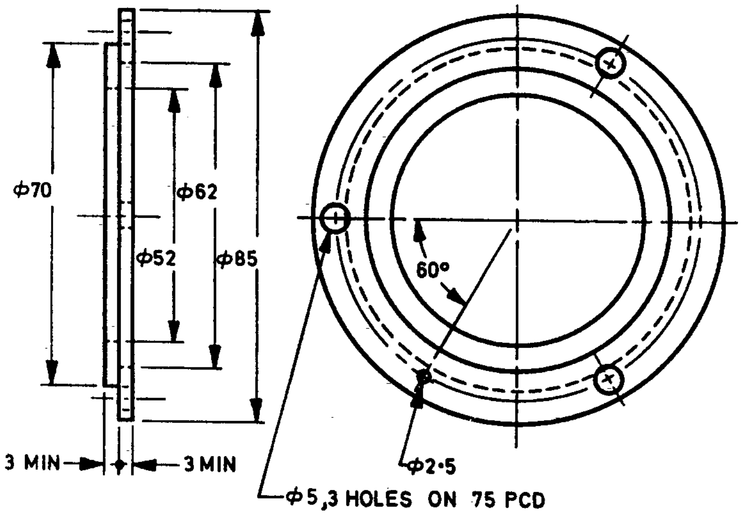
The dimensions of retaining ring and cover shall be as given in Fig. 15 (for Type 1 and Type 2 seed feed rollers) and Fig. 16 (for Type 3 seed feed rollers).

C-1.4 Seed Feed Cup

The dimensions of the seed feed cup shall be as given in Fig. 17 (for Type 1 and Type 2 seed feed rollers) and Fig. 18 (for Type 3 seed feed rollers). The dimensions of spout and feed plate for Type 3 seed feed roller shall be as given in Fig. 19.



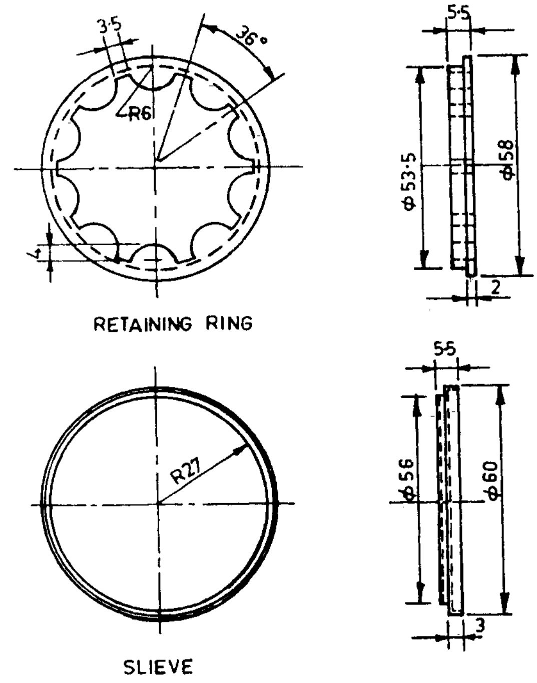
RETAINING RING



COVER

All dimensions in millimetres.

FIG. 15 RETAINING RING AND COVER (FOR TYPE 1 AND TYPE 2 SEED FEED ROLLER)



All dimensions in millimetres.

FIG. 16 RETAINING RING (FOR TYPE 3 SEED FEED ROLLER)

C-2 PLATE TYPE

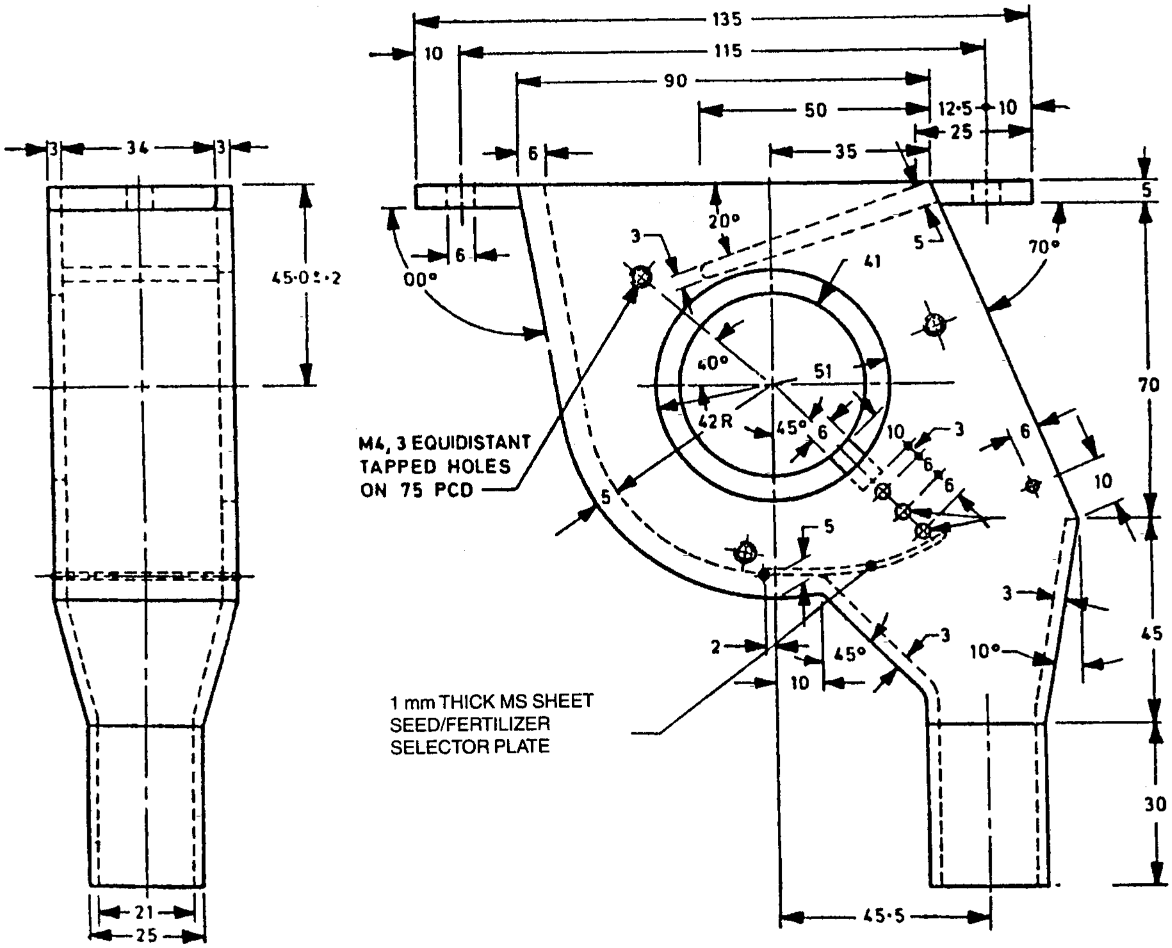
C-2.1 Seed Plates

Seed plate shall be of four types (*see* Fig. 20 to 23), namely Type 1 to Type 4. The dimensions of Type 1 to Type 4 seed plate shall be as given in Fig. 20 to 23 respectively.

C-2.1.1 Suitable arrangement for locking the plates shall be provided.

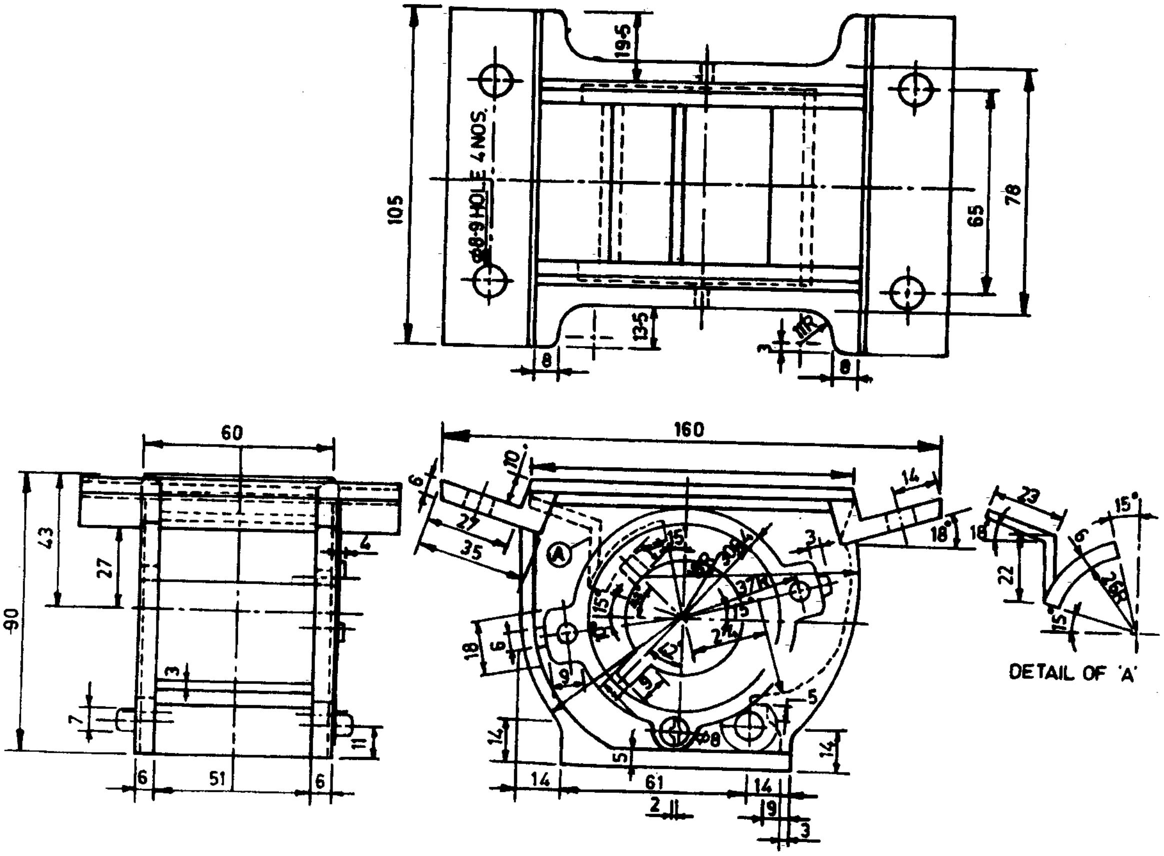
C-2.2 Seed Feed Rollers

Seed feed rollers for plate type metering mechanism shall be of three types, namely Type 1, Type 2 and Type 3. The dimensions of these rollers shall be as given in Fig. 24 to 26.



All dimensions in millimetres.

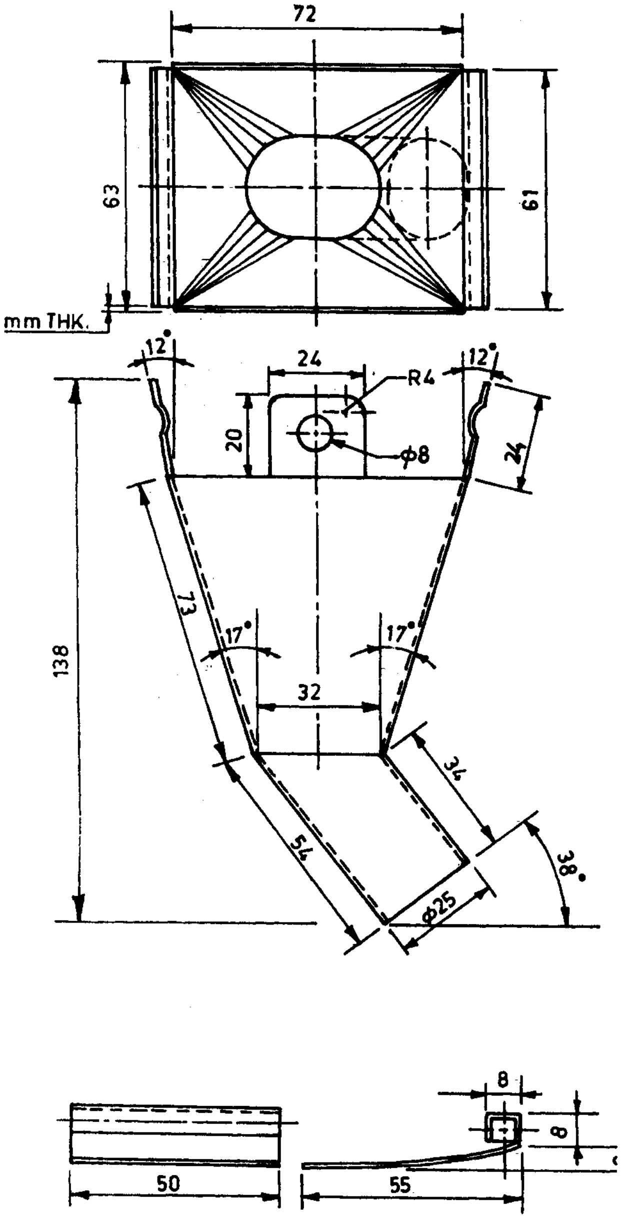
FIG. 17 SEED/FERTILIZER FEED CUP



All dimensions in millimetres.

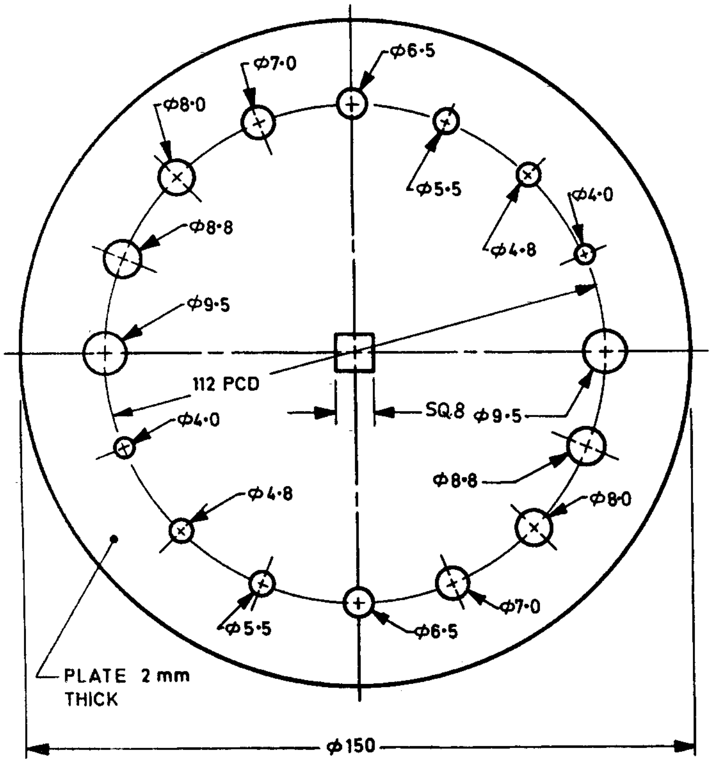
FIG. 18 SEED FEED CUP

]



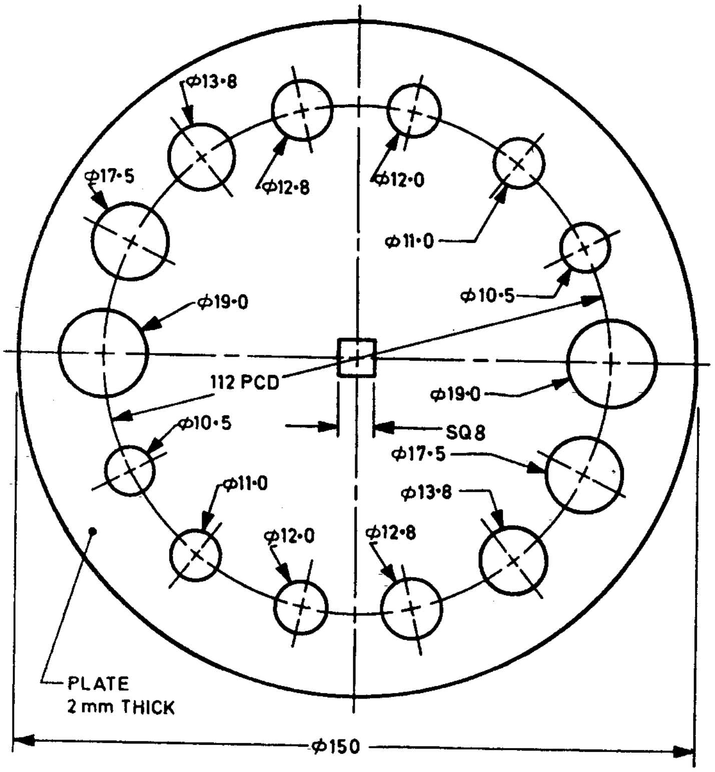
All dimensions in millimetres.

FIG. 19 SPOUT AND FEED PLATE



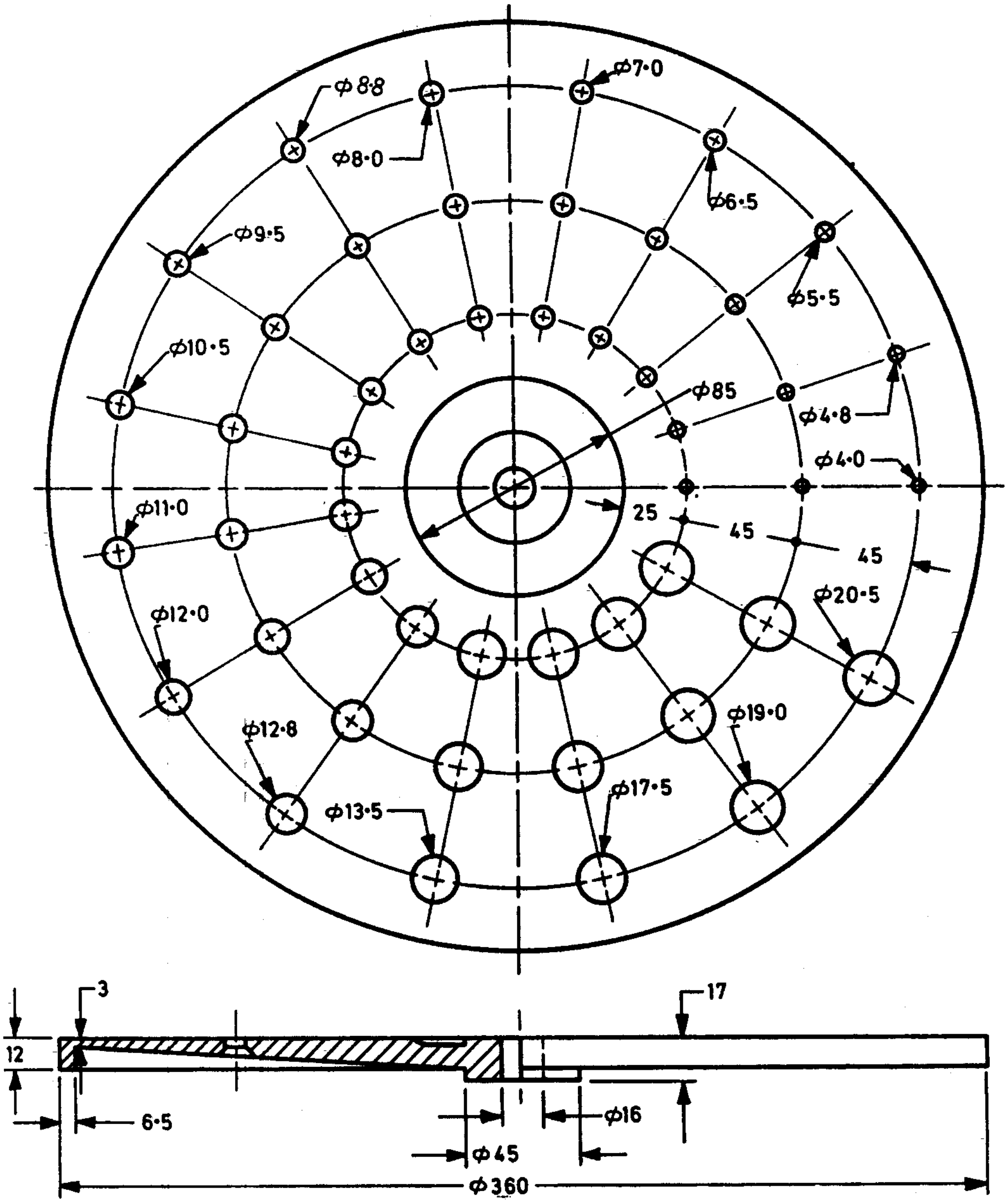
All dimensions in millimetres.

FIG. 20 SEED PLATE (TYPE 1)



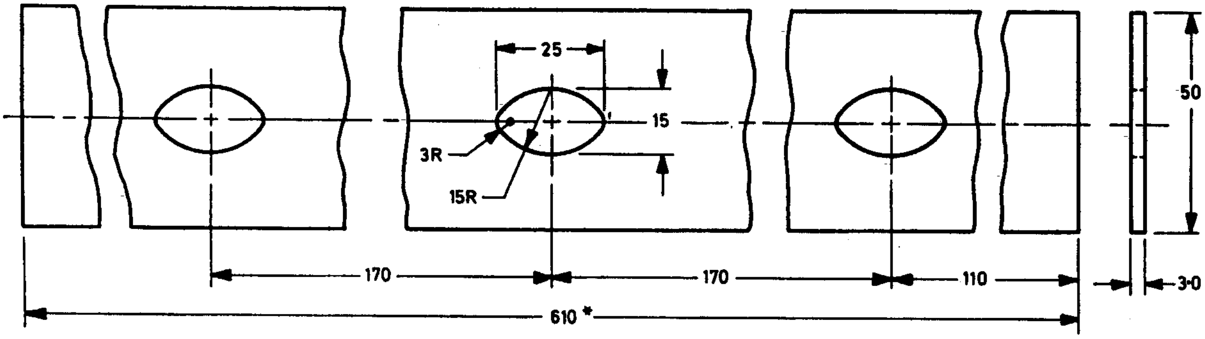
All dimensions in millimetres.

FIG. 21 SEED PLATE (TYPE 2)



All dimensions in millimetres.

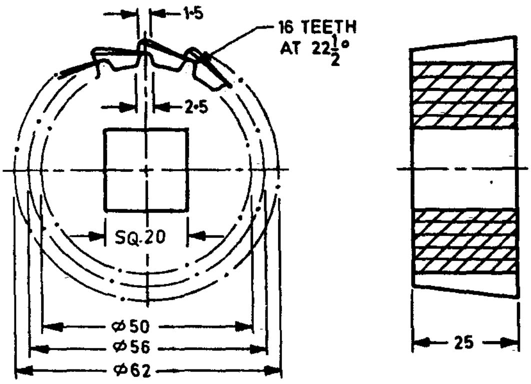
FIG. 22 SEED PLATE (TYPE 3)



* If the number of holes is less or more than 3, deduct or add 170 mm for decrease or increase of each hole.

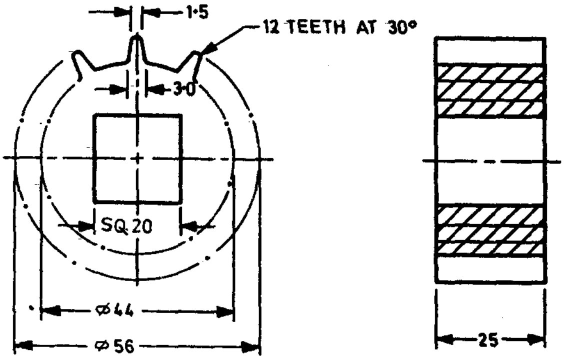
All dimensions in millimetres.

FIG. 23 SEED PLATE (TYPE 4)



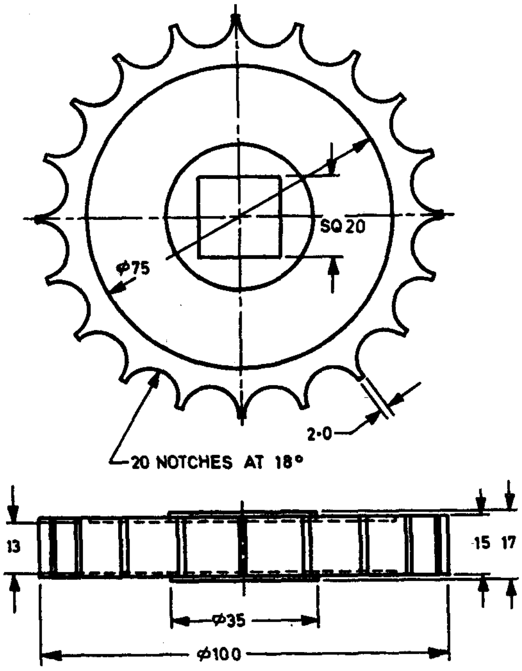
All dimensions in millimetres.

FIG. 24 SEED FEED ROLLER (TYPE 1)



All dimensions in millimetres.

FIG. 25 SEED FEED ROLLER (TYPE 2)



All dimensions in millimetres.

FIG. 26 SEED FEED ROLLER (TYPE 3)

ANNEX D

(*Clause* 8.8.2)

SPECIFIC REQUIREMENTS OF COMPONENTS OF FERTILIZER METERING MECHANISM

D-1 FLUTED FEED ROLLER TYPE

Fluted feed rollers for fertilizers shall be of two types namely, Type 1 and Type 2.

D-1.1 Fertilizer Feed Rollers

The dimensions of the fertilizer feed rollers Type 1 and Type 2 shall be as given in Fig. 27 and Fig. 28. The hole for shaft in rollers may be either circular or square.

D-1.2 Fertilizer Feed Cut-Off

The dimensions of fertilizer feed cut-off Type 1 and Type 2 shall be as given in Fig. 12 and Fig. 13. The hole for shaft in cut-off may be either circular or square.

D-1.3 Retaining Ring and Cover

The dimensions of retaining ring and cover shall be as given in Fig. 29.

D-1.4 Fertilizer Feed Cup

The dimensions of the fertilizer feed cup shall be as given in Fig. 17.

D-2 PLATE TYPE

D-2.1 Fertilizer Plates

The dimensions of fertilizer plate shall be as given in Fig. 30.

D-2.1.1 Suitable arrangement for locking of the plates should be provided in the plates.

D-2.2 Agitator Roller

The shape and dimensions of the agitator roller shall be as given in Fig. 31.

D-2.2.1 Provision for securing the agitator roller with shaft over the metering plate orifice shall be made on roller.

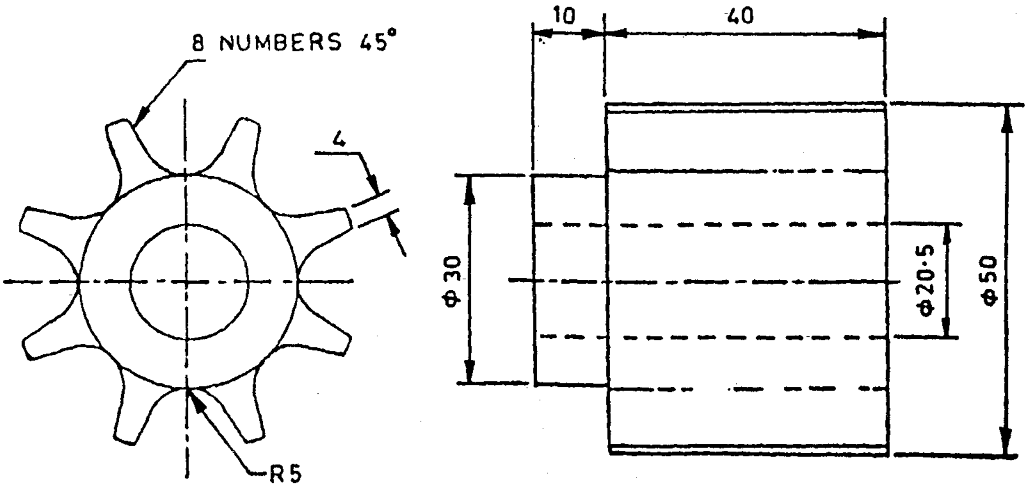
D-2.3 Auger Roller

The shape and dimensions of the auger roller shall be as given in Fig. 32.

D-2.3.1 Auger roller shall be properly secured on the shaft.

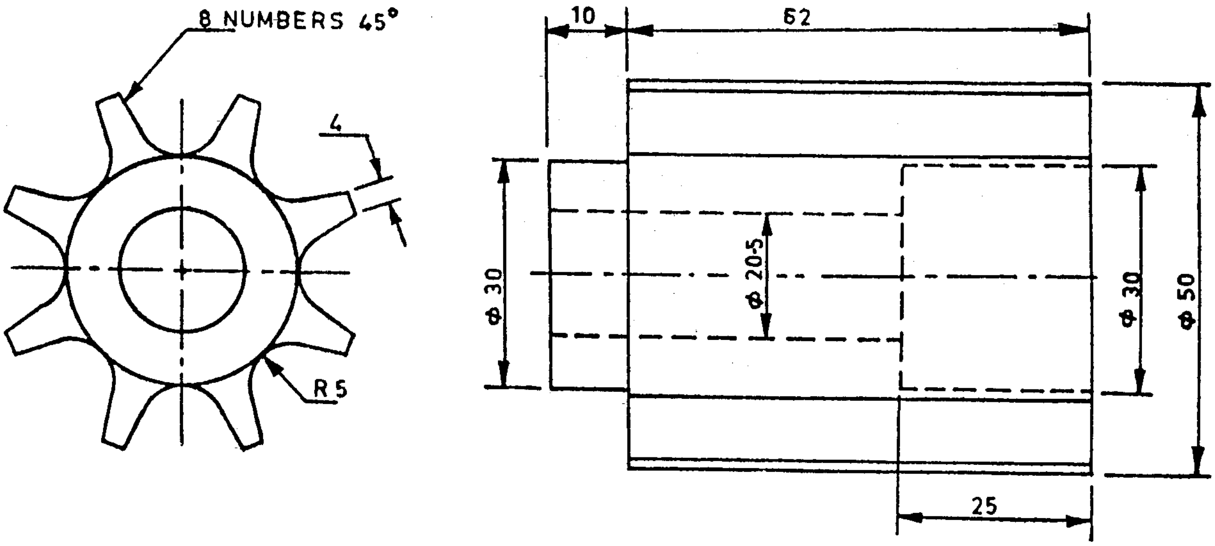
D-2.4 Fertilizer Feed Cup

The dimensions of the fertilizer feed cup for plate type metering mechanism shall be as given in Fig. 33.



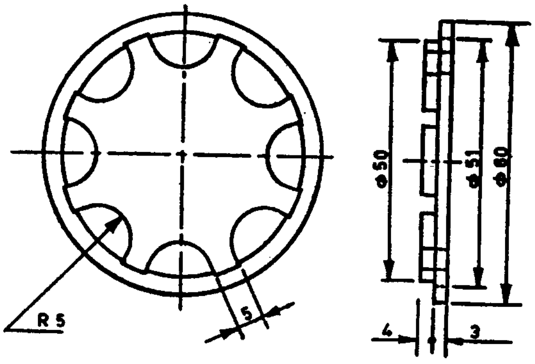
All dimensions in millimetres.

FIG. 27 FERTILIZER FEED ROLLER (TYPE 1)

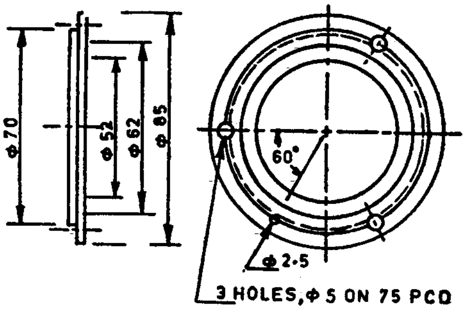


All dimensions in millimetres.

FIG. 28 FERTILIZER FEED ROLLER (TYPE 2)

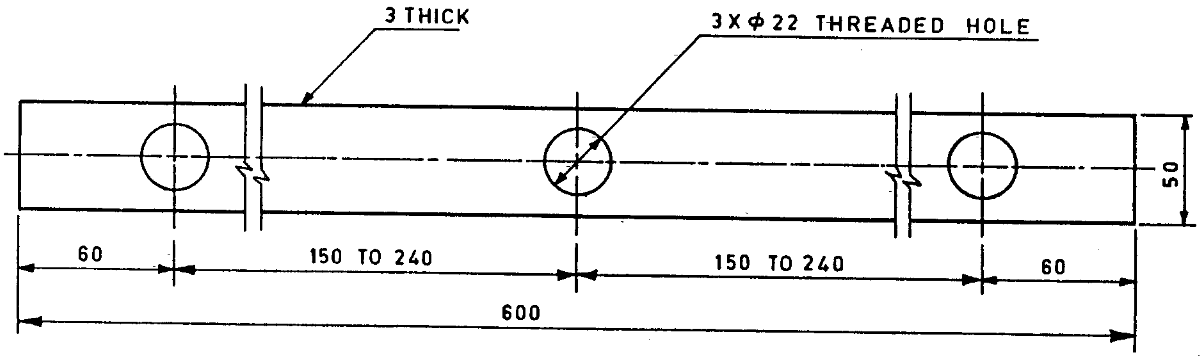


RETAINING RING



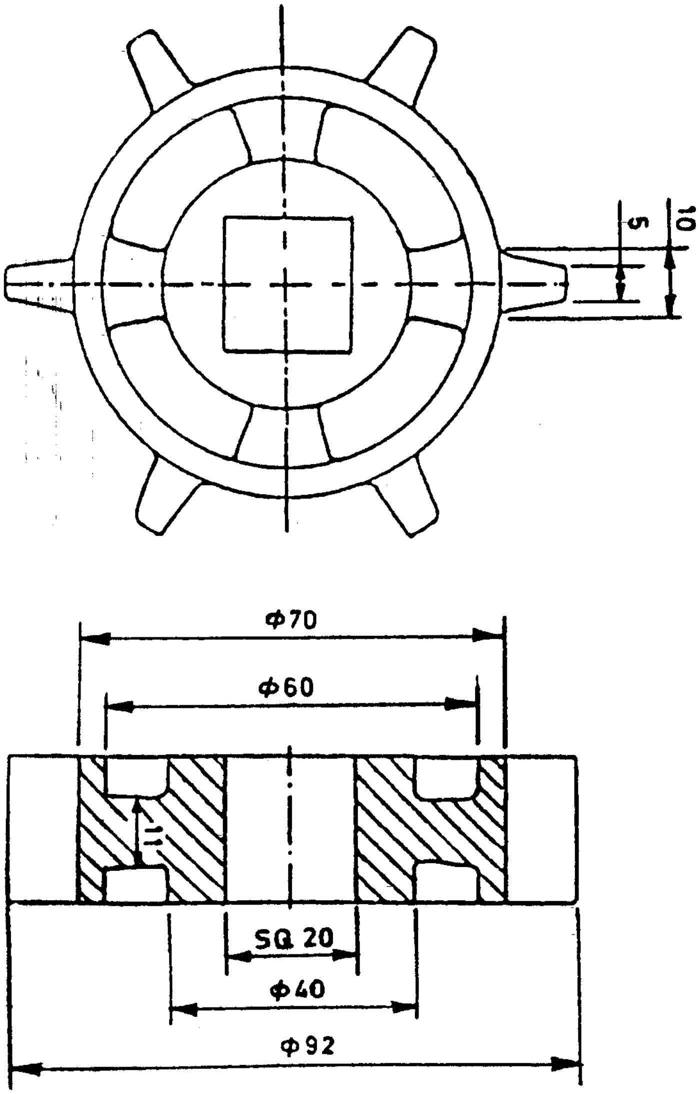
COVER

Fig. 29 Retaining Ring and Cover



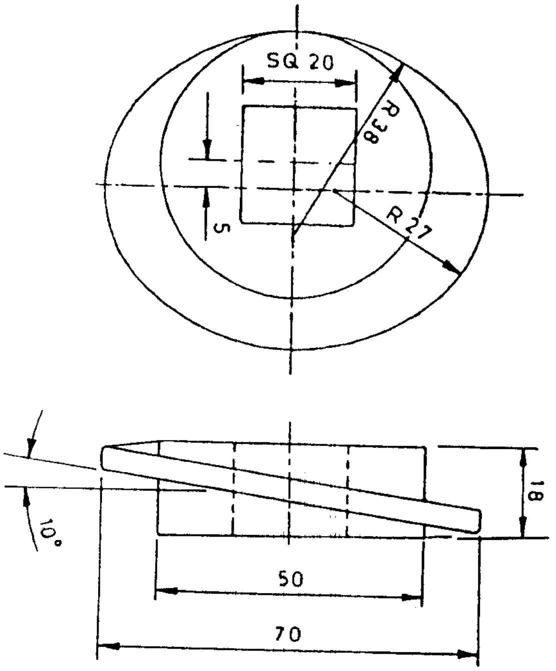
All dimensions in millimetres.

Fig. 30 Fertilizer Plate



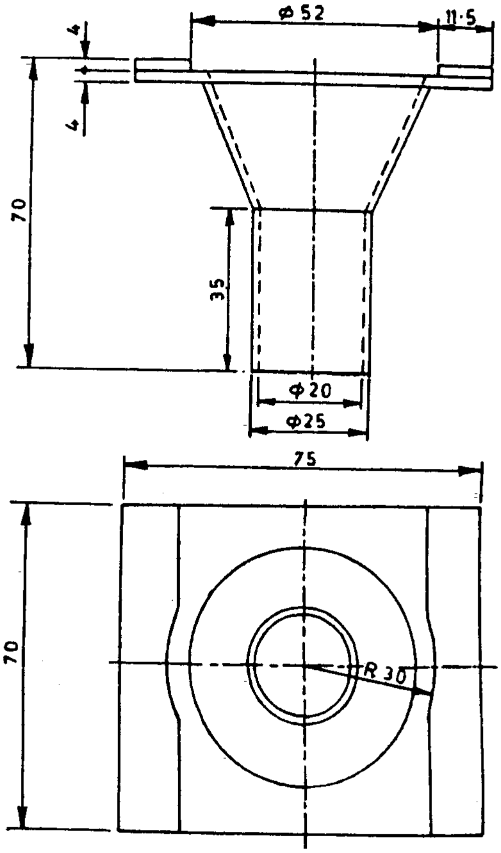
All dimensions in millimetres.

Fig. 31 Agitator Roller



All dimensions in millimetres.

FIG. 32 AUGER ROLLER



All dimensions in millimetres.

FIG. 33 FERTILIZER FEED CUP

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